# Stickiness, Seed-coat Fragments:

# Measurements and consequences

Centre
de coopération
internationale
en recherche
agronomique
pour le
développement

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# Plan of presentation

- **Introduction**
- **Sticky cottons: various solutions to counter this contamination from the field to the mill**
- **Seed-coat fragments, an impurity that can lead to quality and productivity troubles**
- **Conclusion**

# Introduction

- Cotton fibres contain various impurities
  - pieces of leaves,
  - stems or seeds…
- They may also be contaminated by insect honeydew.
- Although it is easy to remove the stem and leaf fragments, sticky particles and seed coat fragments (SCF) are difficult to extract.

# Introduction

- These two contaminants remain in the cotton up to the spinning process where they cause production and quality losses.

- They have now become the main contaminants present in cotton.

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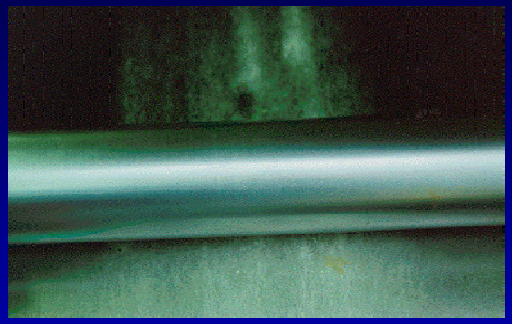
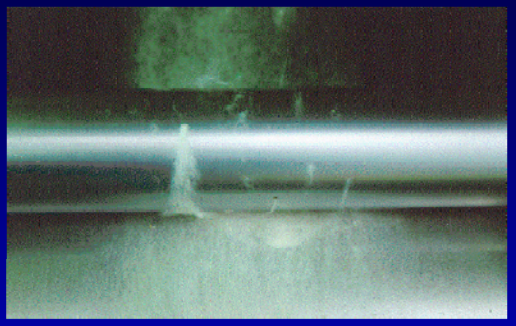
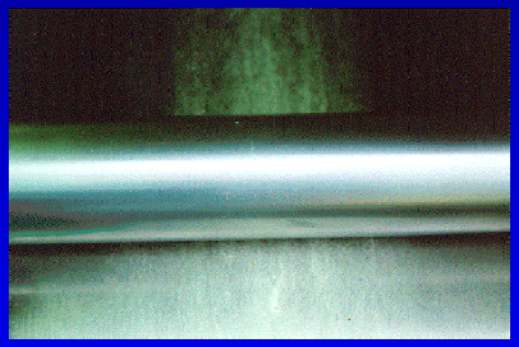
# Stickiness

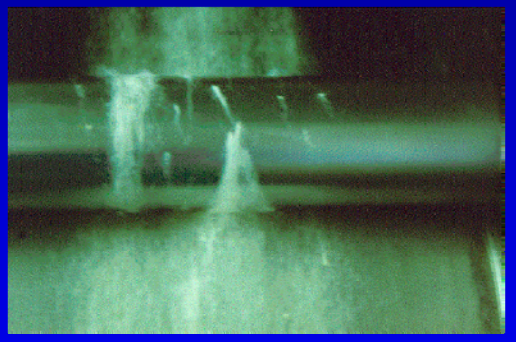
***Aphis gossipii***

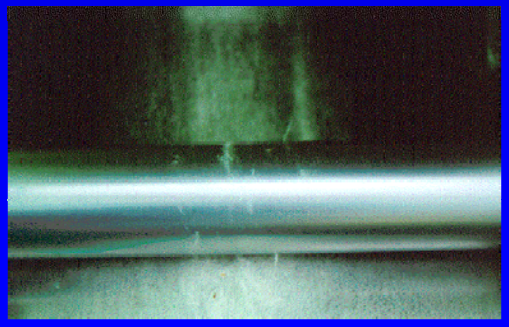
***Bemisia tabaci***

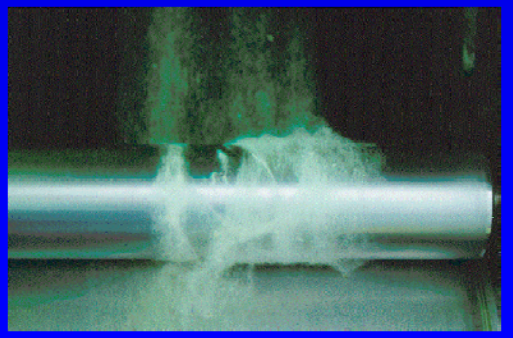












# Existing methods to measure stickiness

- Simple chemical method : not very well linked with stickiness
- Complex chemical tests : HPLC, Chromatography … good for individual sugars quantification, but long and costly
- Mechanical and thermo-mechanical tests …

# Some used measuring devices for stickiness evaluation





# Measurements can be done

- At the production stage (after ginning)
- At the trader stage on collected samples
- At the spinning mill

- These measurements are done to establish the stickiness level and organize the purchase

# Stickiness : Two approaches

- 1- Counter stickiness in the fields :
  - Favourable sewing dates and of appropriate spacing between cottons rows
  - New varieties with determined growth cycle and low leaf area
  - Reasoned use of supplementary chemical treatments
  - Manual or mechanical topping, or application of defoliants, and early cotton harvest …

=> Stickiness problem remains

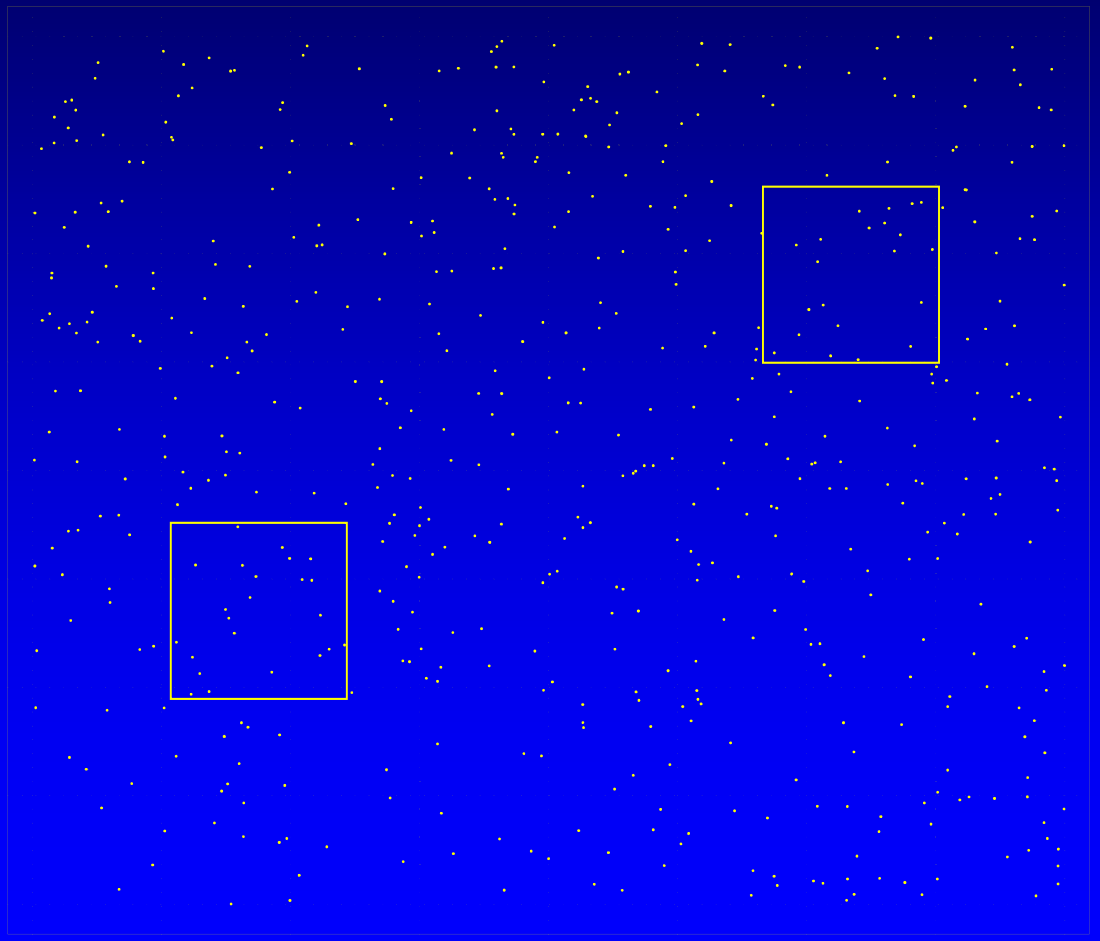
# Stickiness : Two approaches

- 2- Counter stickiness in the transformation stages:
  - Often used
    - Use of mixes
    - Change in moisture content
    - New auto-cleaning cards …
  - Under evaluation / research : for reducing the stickiness effect
    - Heating technique (Rieter, 1991)
    - Micro-wave (Polli, 1990)
    - Neutralization technique (Cirad, 1991) …

# Spatial distribution of ‘Poisson’

## Random distribution and homogeneous density

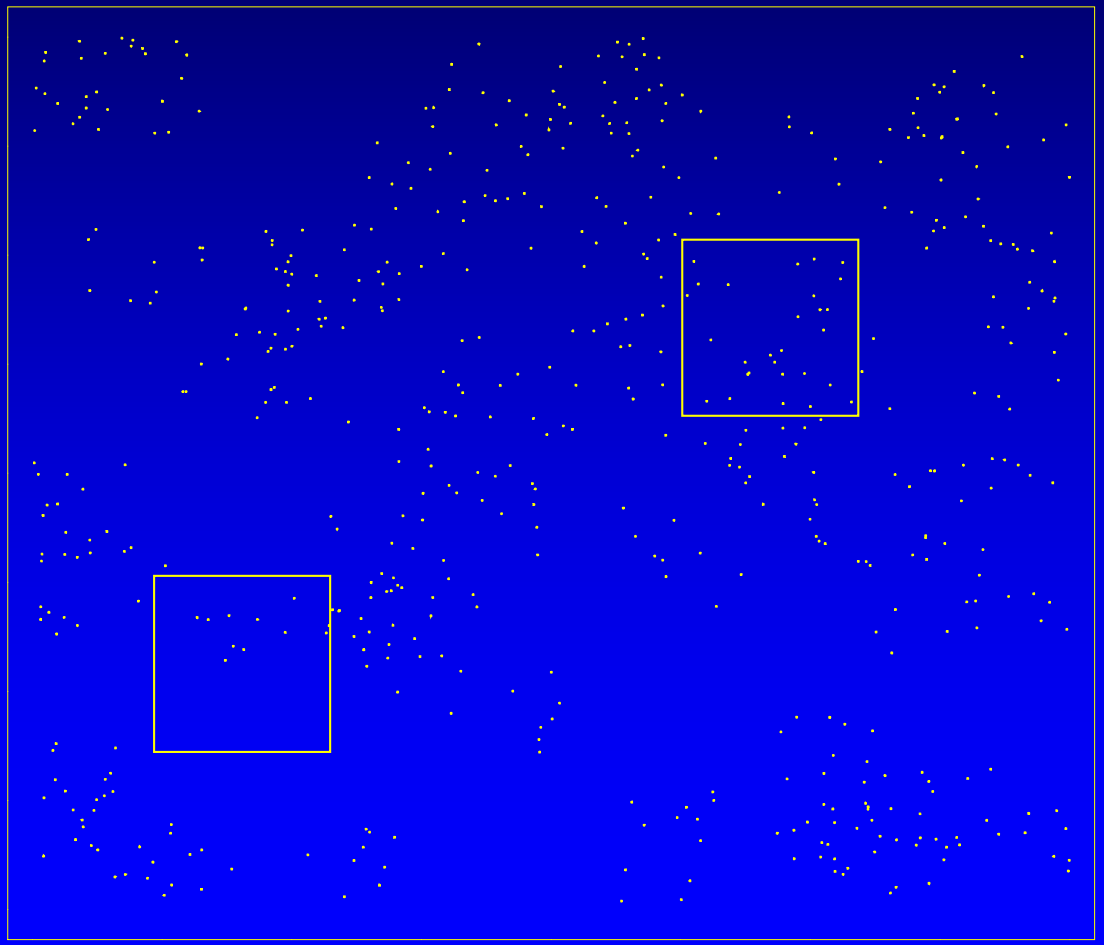
$\sigma^2$ = moyenne



# Spatial agregative distribution

Agregates, non homogeneous density
=> over-dispersion

$\sigma^2$ > moyenne

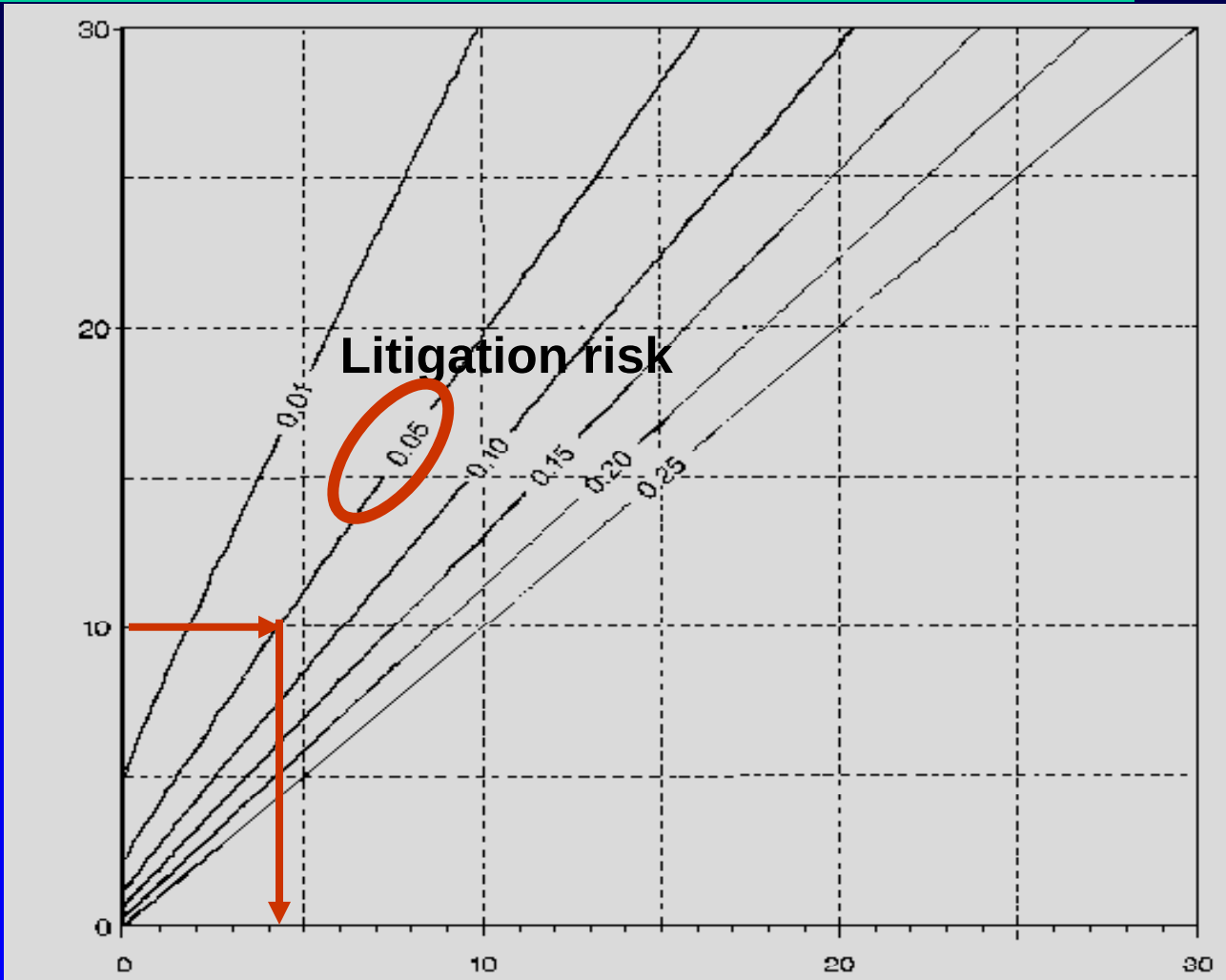


# Chart taking care of the litigation risk (1 measure / sample using H2SD)

Evaluation threshold

Example :

- litigation risk < 5%
- stickiness < 10 points




=> Stickiness < 4 points at the classing

From CFC/ICAC 11, 2001

Classification threshold

# Latest developments

- White fly honeydew and Aphid honeydew do not induce the same type of problems during transformation (Hequet, 2002)
- Stickiness potential of sugars …
- CEN standards ongoing
- Reference cottons

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# Some used measuring devices for SCF evaluation (1/2)

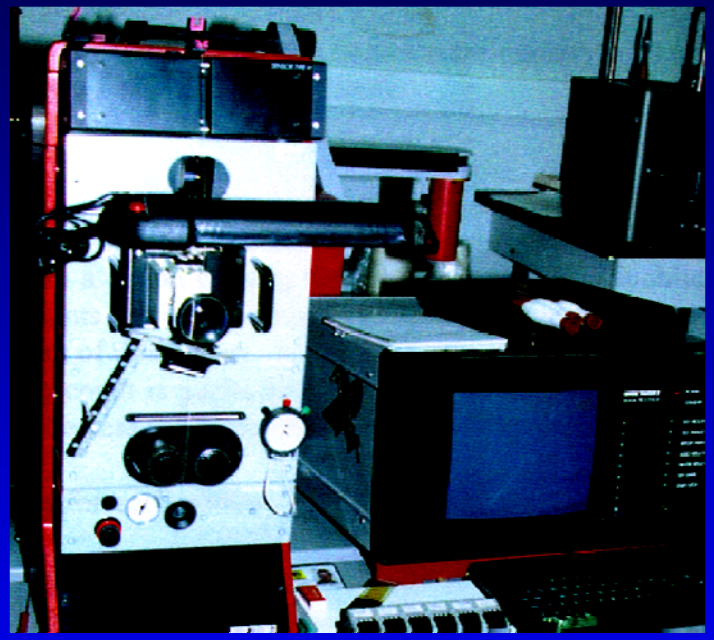
- Visual methods (ASTM D2496-80)
  - Nep-Tester on sliver, etc : time consuming
- Mechanical methods (trash removal)
  - MDTA-3, Zellweger-Uster
- Opto-electronic methods
  - AFIS, Zellweger-Uster (ASTM 1995),
  - FQT from Lintronics,
  - Lenzing Instruments

# Some used measuring devices for SCF evaluation (2/2)

- Image analysis
  - On line Nep Control on Trützschler cards
  - Trascham / CATI by Cirad
  - Analyra by Cirad
- Evenness testers
  - UT3, UT4, Zellweger-Uster
  - Yarn Tester, Superba

# Neps characterization on UT3 eveness tester

Eveness tester UT3

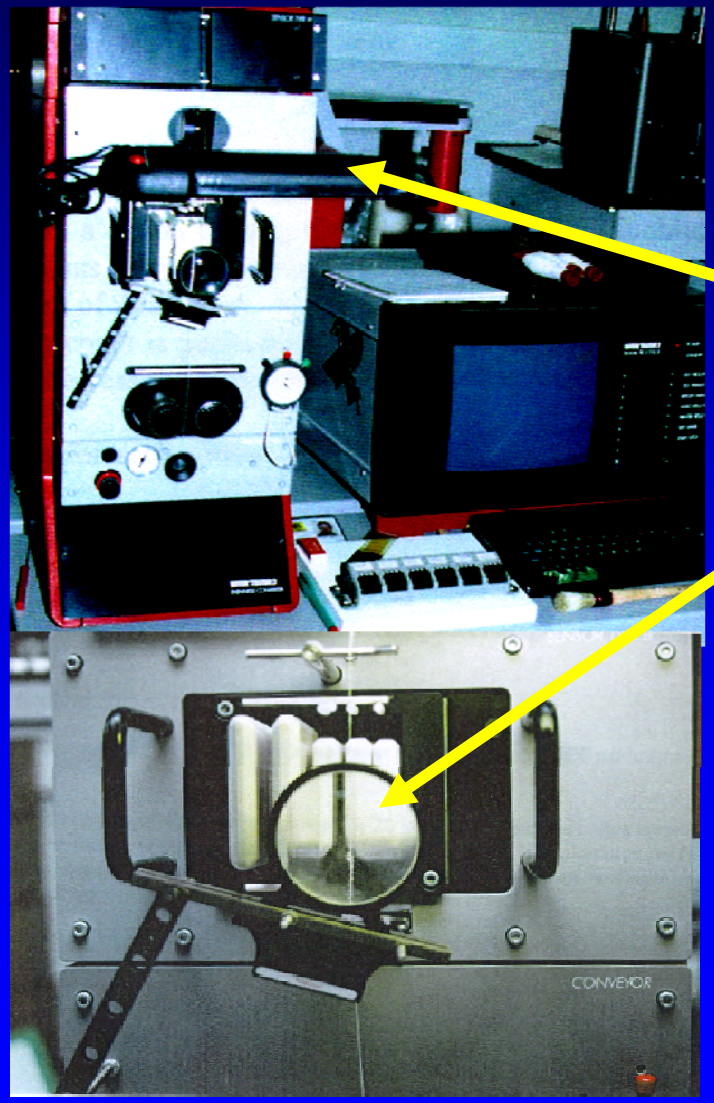


**Provides a global counting of imperfections or neps on yarn**

**Not well adapted for breeding purposes where Seed Coat Fragment (SCF) content is required (heritability)**

# Neps characterization on UT3 eveness tester

Eveness tester UT3




## Apply of a detailed analysis

Lamp

+ Magnifyer

+ UT3 stop on every nep

Thresholds :

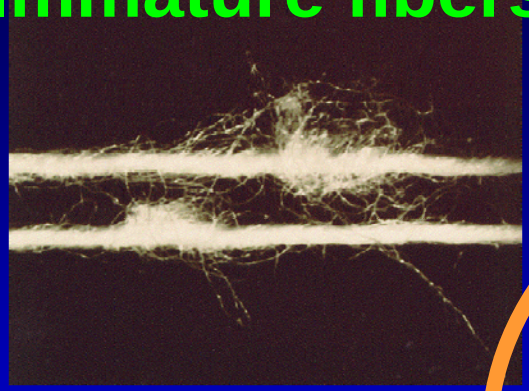
- 200% for ring spinning

- 280% for open end

+ Categorization (according to thresholds …)

# Different types of nep in the yarn

## Immature fibers



## Process neps

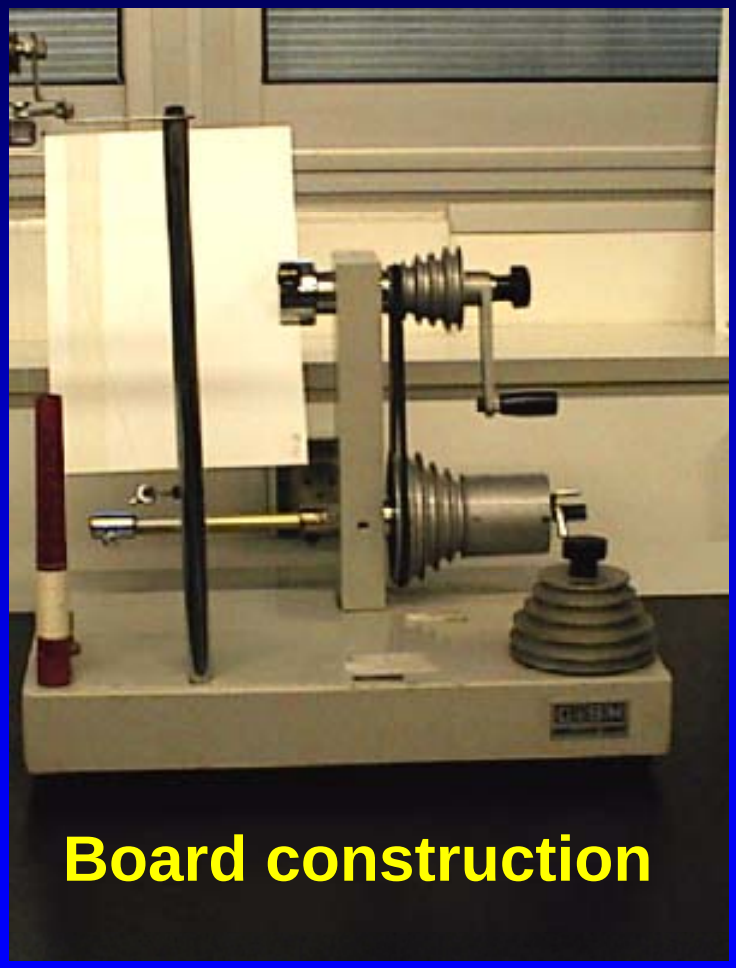
## Seed Coat Fragment

## Sticky neps

## Trash particle

From Frydrych R. 1988

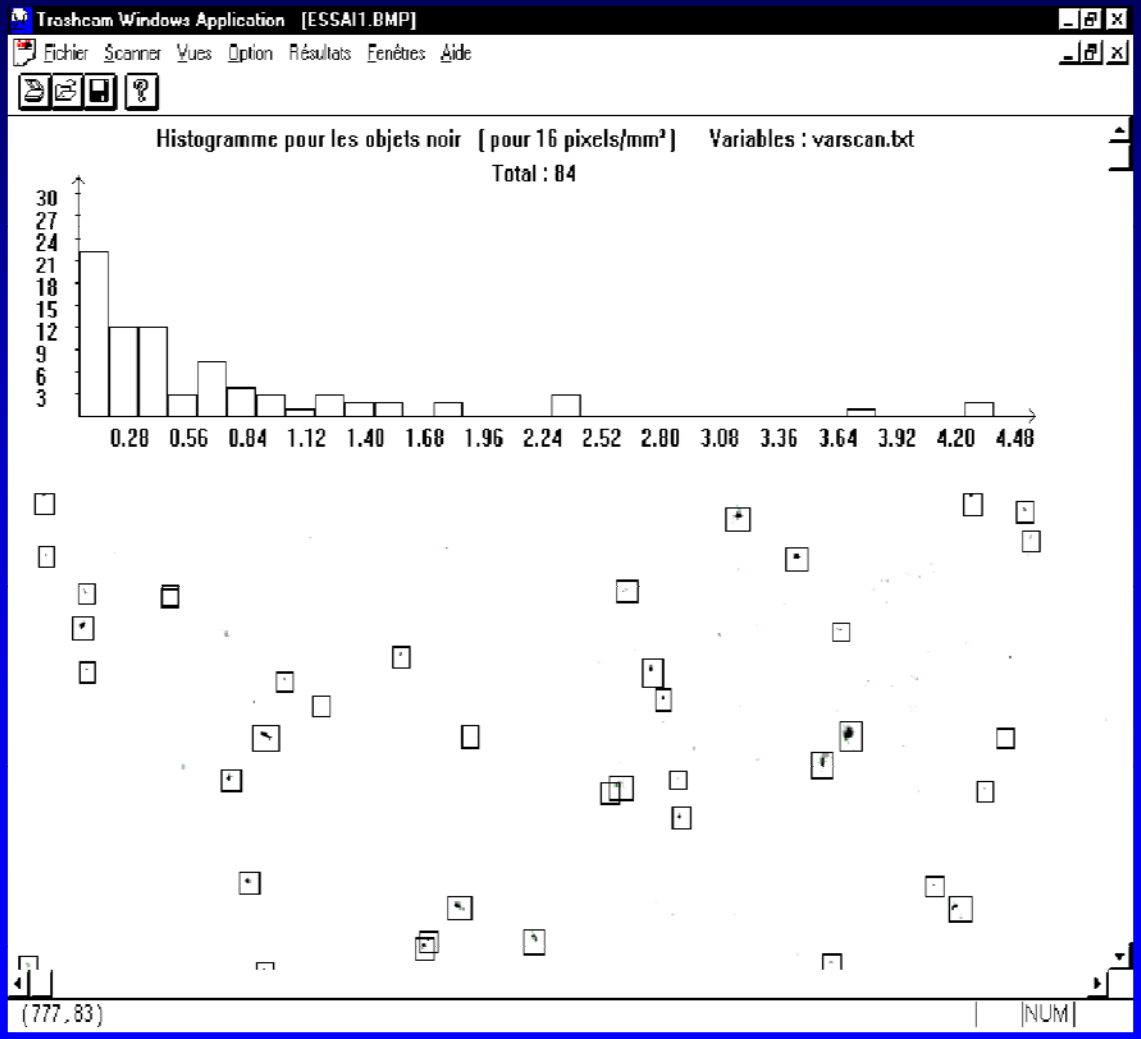
# SCF detection on yarn boards by Trashcam/CATI



Board construction

Scanner

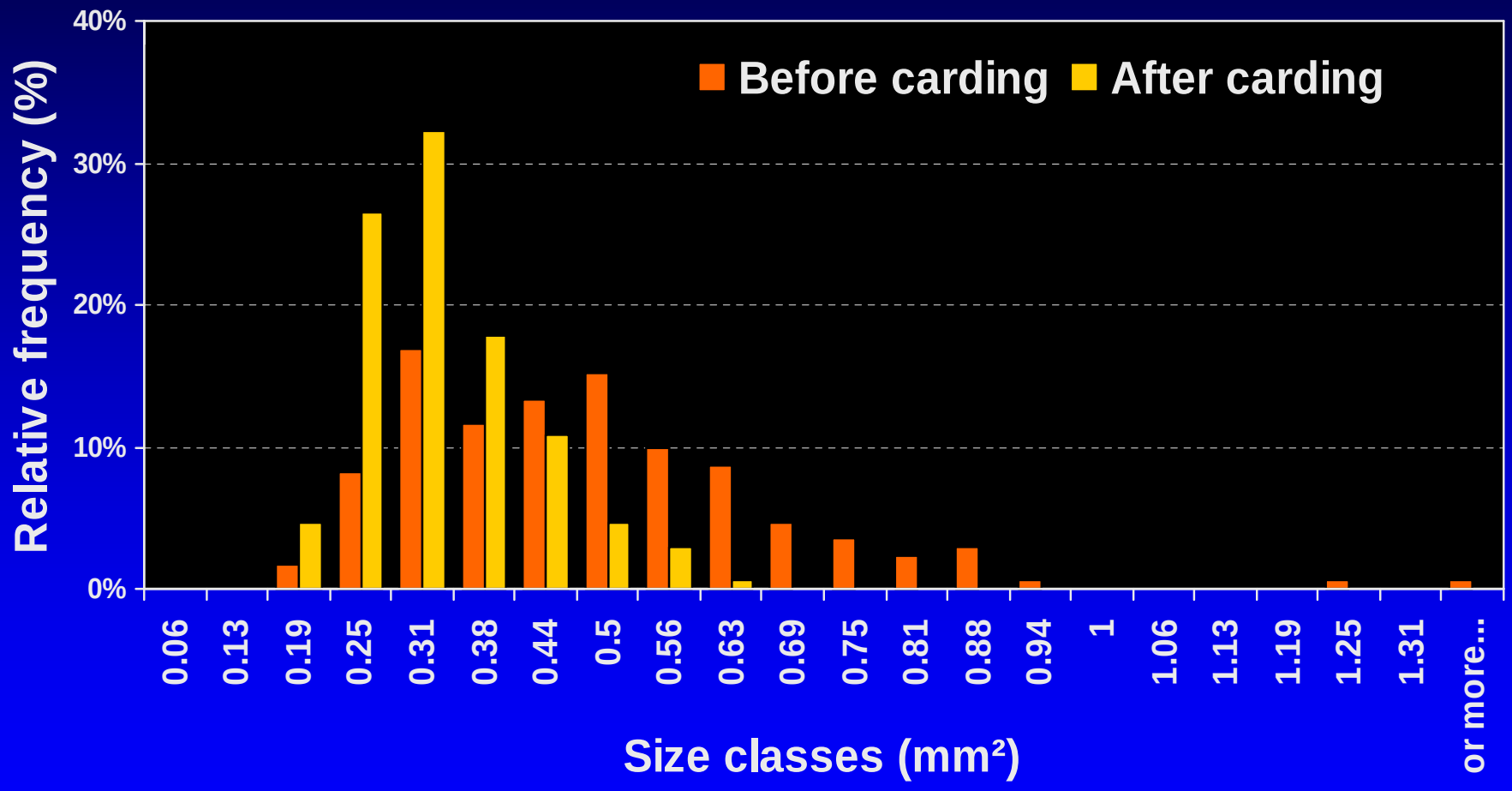
# SCF detection on yarn boards by Trashcam/CATI




- Counting SCF
- SCF Size distribution from size > 0.05 mm²

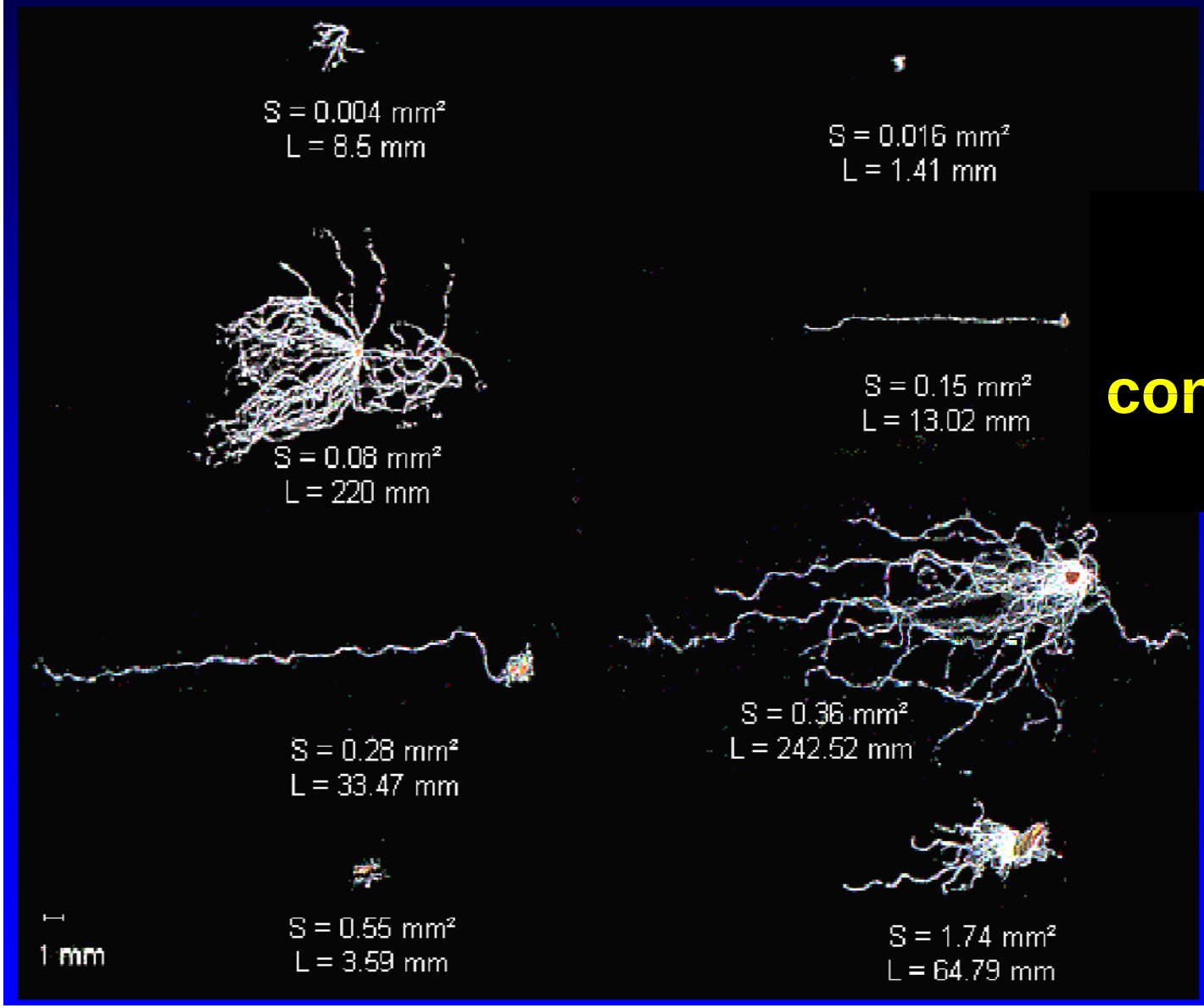
**Size distribution can shift right or left by processing operations : fragmentation, removal …**

# SCF size distribution before and after carding (Trashcam/CATI)




➢ Number ↗ Size ↘ ➡ Fragmentation

# SCF : shape, size (Trashcam) and length of the attached fibers (Analyra)




**Various consequences …**

**From Krifa M. 2001**

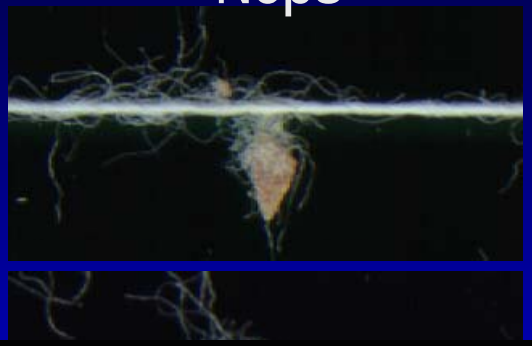
# Induced defaults in the yarn by SCF

Neps

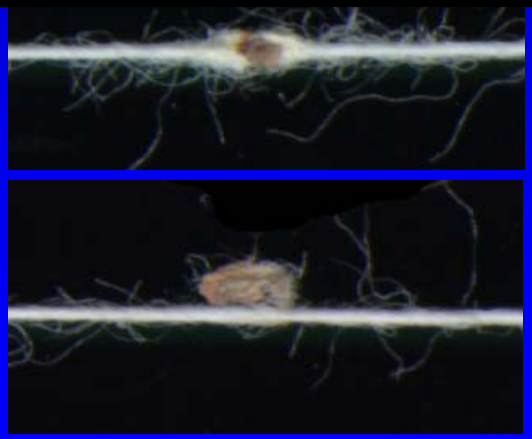
Thick place

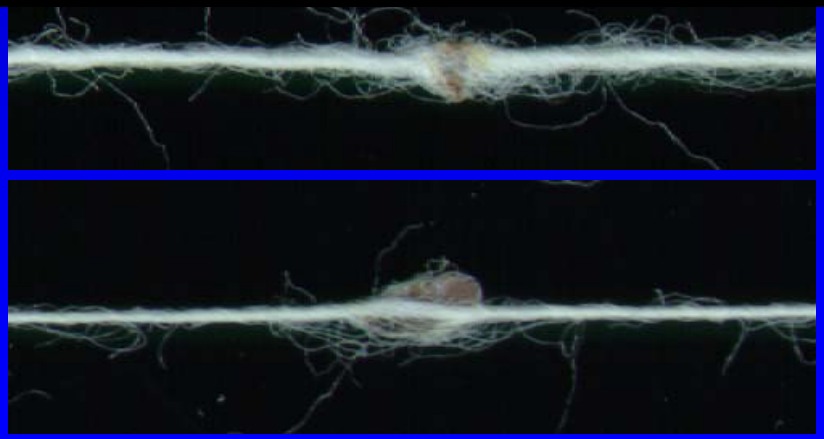
Short default

Long default



**… and consequences of consequences …**

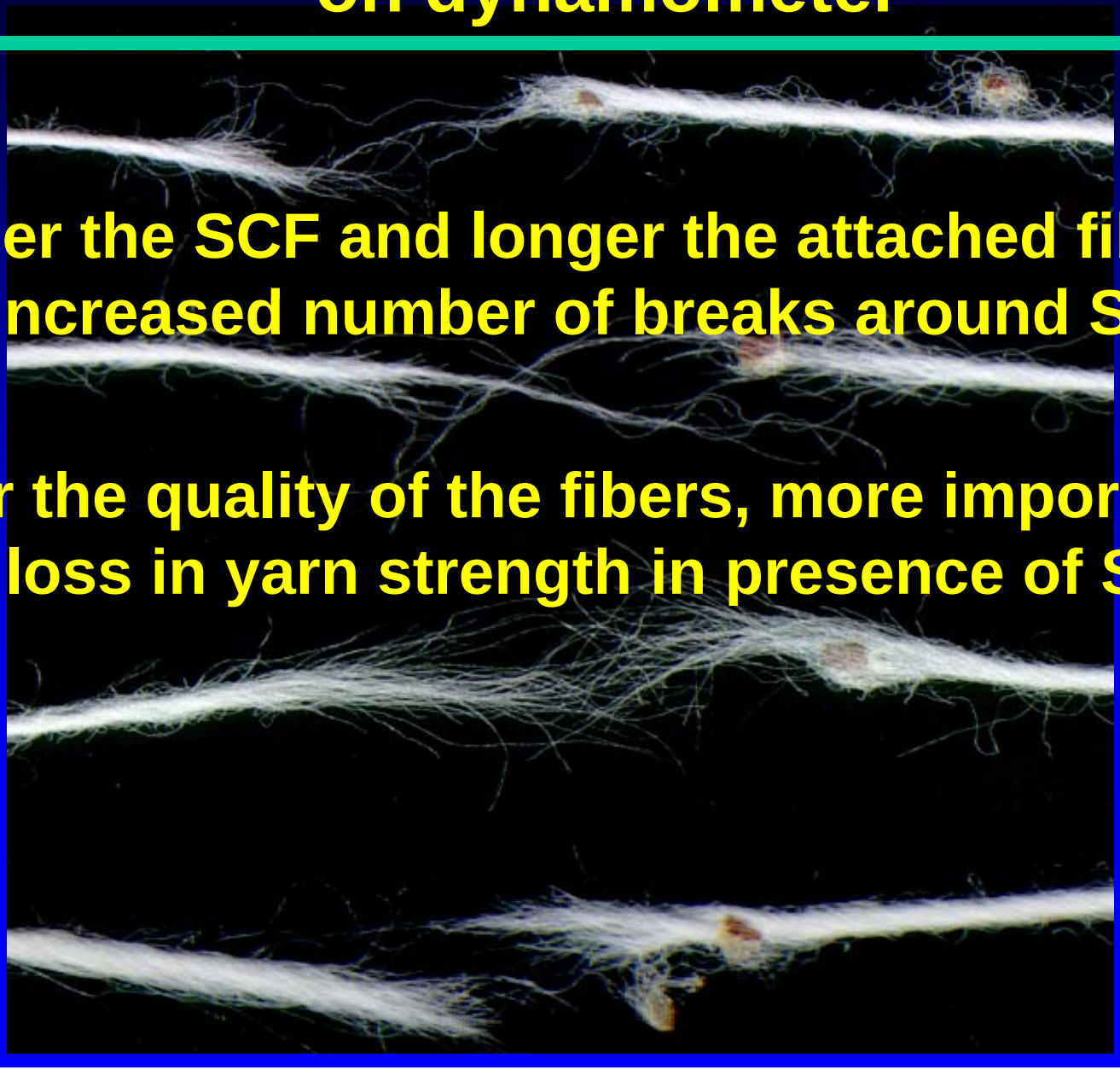




5 mm

From Krifa M. 2001

# SCF in RS yarn, individual breaks on dynamometer

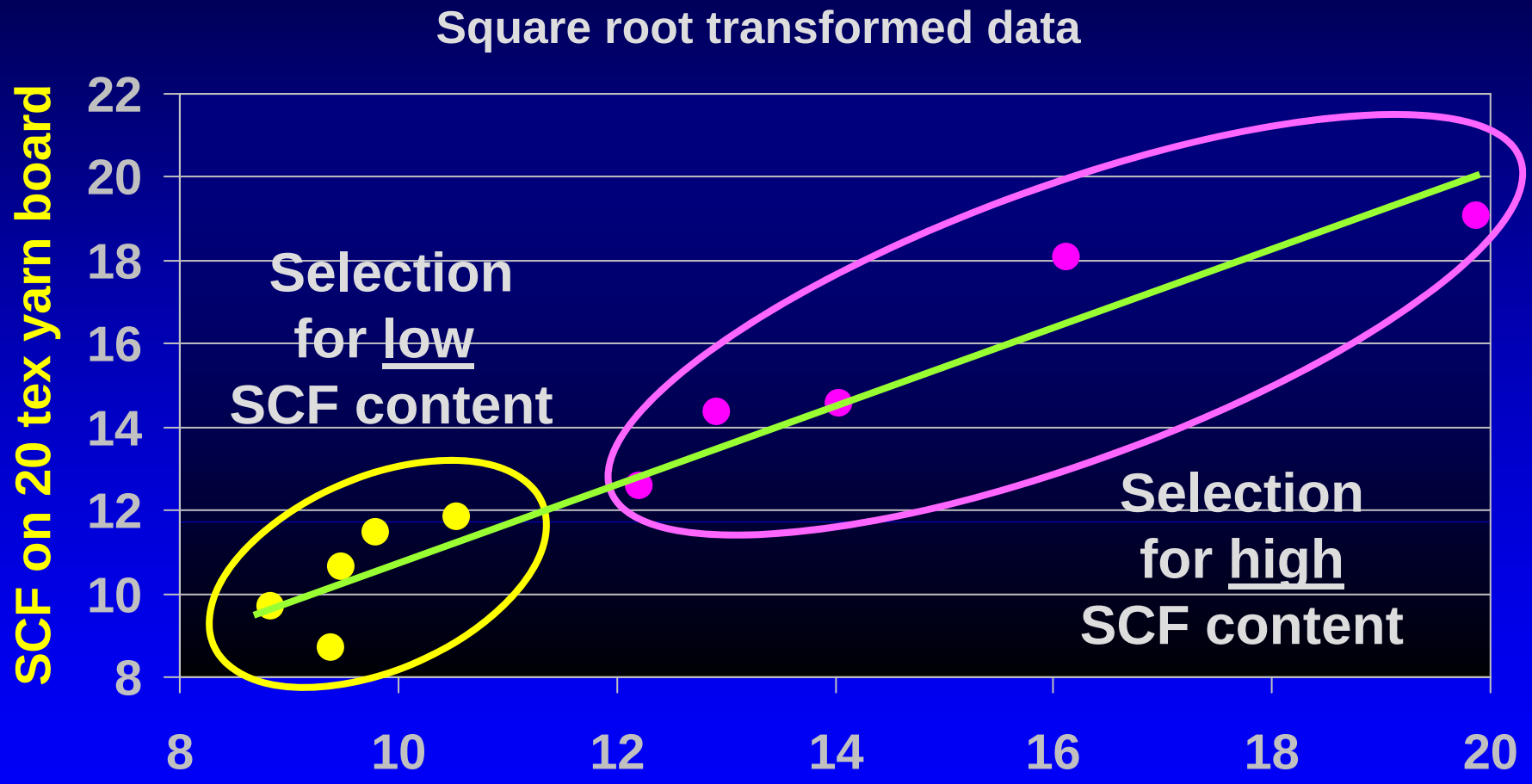


**Bigger the SCF and longer the attached fibres => Increased number of breaks around SCF**

**Higher the quality of the fibers, more important is the loss in yarn strength in presence of SCF**

**From Krifa M. 2001**

# Breeding efficiency towards SCF




From Bachelier B. 1998

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# Conclusion

- The results obtained for stickiness and seed coat fragments can today be used in the overall management of these two contaminants: from the field to the processing.

- If stickiness persists, it is possible to propose solutions in the field level and reduce its negative effects during spinning.

# Conclusion

- **Seed coat fragments should be well controlled through breeding.**
- **Still a lot of a research and developement work to do … as all troubles are not fixed.**


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# Thank you

# for

# your attention